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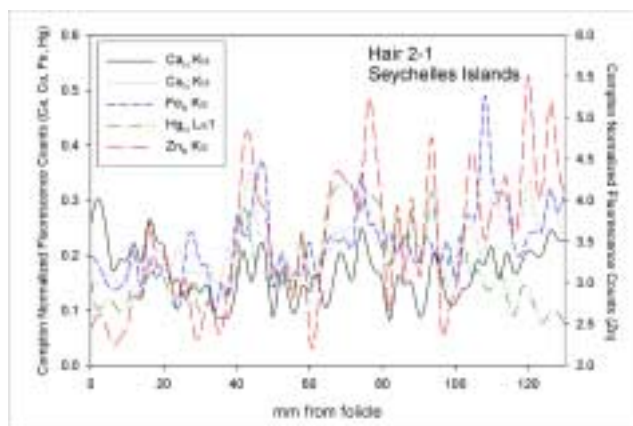
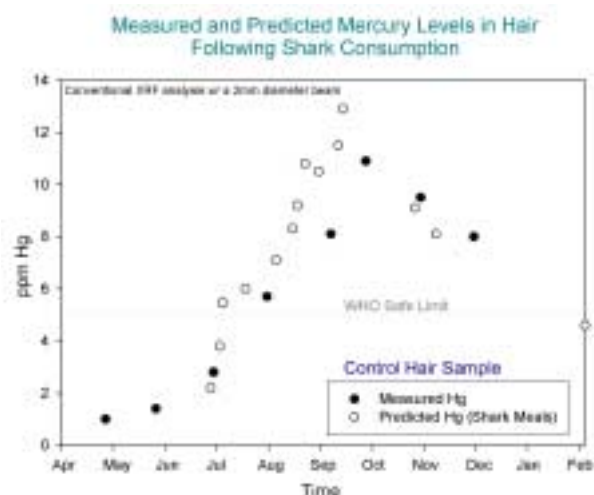
Human Health Risks from Methyl Mercury in Fish

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Beamline(s): X26A

Human health risks from methyl mercury in fish have been investigated in three epidemiological studies of children prenatally exposed to methyl mercury in seafood. One study is located in the Faroe Islands in the North Atlantic on a population where exposure to methyl mercury is from consumption of whale meat, ocean fish, and sea birds and their eggs. Studies in New Zealand and the Seychelles Islands considered populations where the exposure is dominantly from consumption of ocean fish. These studies included cord blood and maternal hair Hg levels as a measure of the mother's body burden of methyl mercury. In this work, we used the x-ray microprobe at Beamline X26A at the BNL NSLS to make measurements of Hg concentrations in hair with a length resolution corresponding to a time increment of less than a day. The improved time resolution will potentially help to resolve differing conclusions drawn from the three studies. We were able to detect Hg levels in human hair with a detection limit of about 1ppm using a 0.010 mm focused monochromatic x-ray beam tuned just above the Hg LIII binding energy. Our results show fine scale variability that may reflect differences in Hg exposure, hair density along the strand, or metabolic changes in the subjects. Measurements of Hg concentrations with a temporal resolution of a day or less have not previously been made.

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The figure on the left shows the mercury concentration measured along a single hair taken from a subject who had consumed several meals of fish containing known amounts of mercury. The experimental data is shown with filled circles and the amounts predicted from the known intake are shown with open circles. Reasonable agreement is found between the experimental and calculated values. The figure on the right shows the concentrations found for mercury and other elements in a single hair taken from a member of the Seychelles Islands study group. Note that a 1 mm length of hair corresponds to a time increment of approximately 2.7 days (assuming a growth rate of 1.1 cm/month). The figure shows that there are marked changes in concentrations for times of the order of a few days